TABLE 2.—*Continued.*

Pollen Tetrad Size in the Winteraceae.—Continued.

Species.	Diameter in Micra.	Measured by.	Collector.
D. winteri var. *andina*	47	I.W.B.	Elwes 13–2–02.
D. winteri var. *andina*	45	I.W.B.	Sargent 1906.
D. winteri var. *andina*	45	I.W.B.	Wedermann 1245.
D. winteri var. *andina*	52	I.W.B.	West 4730.
D. winteri var. *andina*	50	I.W.B.	West 4900.
D. winteri var. *chilensis*	47	I.W.B.	Behn F.M. 633989.
D. winteri var. *chilensis*	45	I.W.B.	Ball.
D. winteri var. *chilensis*	47	I.W.B.	Buchtien F.M. 1024488.
D. winteri var. *chilensis*	45	—	U.S. 1177402.
D. winteri var. *chilensis*	47	I.W.B.	Gay 171.
D. winteri var. *chilensis*	42	I.W.B.	Grandjot.
D. winteri var. *chilensis*	45	I.W.B.	Hastings 355.
D. winteri var. *chilensis*	42	I.W.B.	C. Joseph 1755.
D. winteri var. *chilensis*	50	I.W.B.	Joseph 3692.
D. winteri var. *chilensis*	47	I.W.B.	Montero 173.
D. winteri var. *chilensis*	45	I.W.B.	Munoz B–117.
D. winteri var. *chilensis*	50	I.W.B.	Wedermann 73.
D. winteri var. *chilensis*	45	I.W.B.	West 5117.
D. winteri var. *punctata*	47	I.W.B.	Crooke 1897.
D. winteri	42	A.T.H.	Cult. Melbourne.
BELLIOLUM.			
B. burttianum	45	I.W.B.	Kajewski 1680.
B. crassifolium	32	I.W.B.	Schlechter 15348.
B. haplopus	42	I.W.B.	Kajewski 1994.
B. haplopus	40	I.W.B.	Kajewski 1658.
BUBBIA.			
B. archboldiana	40	I.W.B.	Brass 12712.
B. clemensiae	42	I.W.B.	Clemens 4596.
B. clemensiae	42	I.W.B.	Clemens 5157.
B. longifolia	45	I.W.B.	Brass 13868.
B. megacarpa	37	I.W.B.	Brass 10249.
B. monocarpa	35	I.W.B.	Kan. *et* Hit. 12105.
B. pachyantha	45	I.W.B.	Brass 4371.
B. semicarpoides	42	I.W.B.	C. T. White.
B. sylvestris	40	I.W.B.	Clemens 4463.
B. sylvestris	40	I.W.B.	Clemens 41142.
B. whiteana	35	I.W.B.	Brass 2278.
B. whiteana	37	I.W.B.	Kajewski 1495.
EXOSPERMUM.			
E. stipitatum	42	I.W.B.	Vieillard 2281.
PSEUDOWINTERA.			
P. axillaris var. *typica*	47	I.W.B.	Cheeseman U.S. 206642.
P. axillaris var. *typica*	42	I.W.B.	Kirk 347.
P. axillaris var. *typica*	45	I.W.B.	Travers 1908.
P. axillaris var. *colorata*	45	I.W.B.	Anderson 213.
P. axillaris var. *colorata*	47	I.W.B.	Oliver U.C. 49987.
P. axillaris var. *colorata*	50	I.W.B.	Raoul 1843.
P. axillaris var. *colorata*	42	I.W.B.	?
ZYGOGYNUM.			
Z. bailloui	47	I.W.B.	Buckholz 1213
Z. vieillardii	42	I.W.B.	Franc 1740.

reasons neither section could have been derived directly from the other. The evidence presented here lends further support to this view, but much more study, especially of other genera, is needed to clarify the cytological situation within the family. So far, cytological investigation of so few out of 88 known species in the Winteraceae represents only a beginning.

Pollen Size.

The pollen grains of the Winteraceae are shed in distinctive permanent tetrads and are different from those of other ranalian plants. In their discussion of the tetrads of pollen grains of the genus *Drimys*, Bailey and Nast (1943) state that their investigations "indicate that in general the tetrads of the Old World Section *Tasmannia* are conspicuously smaller than the tetrads of the New World Section *Wintera* of the genus". Their figures (1–5) illustrate one New World species and four Old World species of *Drimys*. Wodehouse (1935) also figures *D. winteri* Forst. (Fig. 91; Plate II, Fig. 9), and gives the dimensions of the individual grains of *D. winteri* as about 34·2μ in diameter. He also gives the dimensions of the grains of *D. piperita* Hook f. as being 18·2μ to 19·4μ in diameter. Erdtman (1943, Plate XIV, figs. 244-245) figures *Drimys axillaris* (*Pseudowintera*) and gives the tetrad dimension as 39μ. Erdtman (1952*b*) also figures the pollen tetrad of *D. winteri* (cult. Copenhagen) and gives its dimension as about 50μ. It is commonly believed, as stated by Erdtman (1952*a*), that "within a given genus the species with high chromosome number have, as a rule, larger pollen grains than those with fewer chromosomes". This, together with the occurrence of diploidy in Section *Tasmannia* contrasted with polyploidy in Section *Wintera* as reported in this paper, would lead one to look for diploidy in the remaining uninvestigated species with the smaller tetrads. It should be noted, though, that both Whitaker (1933) and Canright (1953) have investigated the relationship between pollen size and degree of polyploidy in *Magnolia*, and both have concluded that in this genus a correlation between these two factors is generally unreliable.

In Table 2 are summarized the measurements of pollen tetrads of 16 species in Section *Tasmannia*, and the four species in Section *Wintera* of the genus *Drimys*, three species of *Belliolum*, nine species of *Bubbia*, one species of *Exospermum*, one species of *Pseudowintera*, and two species of *Zygogynum*. All measurements were made of pollen tetrads mounted in lactic acid. The diameters were taken from tetrads with three grains lying in the same focal plane as indicated in Text-figure 5. In estimating the error, it should be taken into account that these are not means but measurements of tetrads which appeared to be of the common size among many on a slide. Also many of the slides had become dry and the pollen was again expanded. When fresh lactic acid is run under the cover glass, the tetrads do not expand as fully as when first mounted. Thus many of the measurements, particularly of the American material, are too low in all probability. The measurements of the Old World pollen, on the other hand, were taken from slides, many of which had never become dry, or from fresh material (of *Drimys* sp. only) which had never been dried. Nevertheless, the measurements reveal a significant difference in size of tetrads between the New World Section *Wintera* and the Old World Section *Tasmannia* of the genus *Drimys*. If the diameters of the tetrads are converted to volumes, this difference becomes even more apparent. This size difference seems to be correlated with the occurrence of polyploidy in one section of the genus and diploidy in the other. There is also a suggestion of a possible similar variation in ploidy in species of *Belliolum* and *Bubbia*.

Summary.

Chromosome counts have been made of four Australian species of *Drimys*. In each case the meiotic chromosome number was 13. Thus the Old World Section of the genus appears to be diploid, while the New World Section is polyploid.

Measurements have been made of the diameter of the pollen tetrads from 36 species of the six genera of the Winteraceae. In *Drimys* there was found to be a significant difference in size of pollen tetrads between the Old and New World Sections of the genus.

Maturation of the stamens in *Drimys* is centrifugal.

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I wish to thank Mr. J. Willis, of the Melbourne Botanical Gardens, and Dr. W. C. Ashby (University of Chicago), Fulbright Scholar at the University of Sydney (1954), for their assistance in collecting material of *Drimys*. I am also grateful to Professor

I. W. Bailey, Harvard University, who has very kindly supplied the 100 measurements of pollen tetrads of the Winteraceae as indicated in Table 2, and to my colleague, Mr. S. Smith-White, for material aid in making the chromosome counts.

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EXPLANATION OF PLATE I.

1. Meiosis, microspore mother cell, *Drimys insipida*. Photograph of metaphase I showing the same 13 bivalents drawn in Text-figure 2. ×2340.

2. Mitosis, tapetal cell, *Drimys insipida*. Photograph of metaphase showing the same 104 chromosomes drawn in Text-figure 2. ×1880.

SOME NOTES ON THE GENUS *POLYSTICHUM* IN SOUTH-EASTERN AUSTRALIA.

By Mary D. Tindale, National Herbarium, Sydney.

(Plate ii.)

[Read 27th April, 1955.]

Synopsis.

A new species of *Polystichum* Roth (Family Aspidiaceae) from New South Wales and Queensland is described. It is most closely allied to *P. formosum* Tindale. A key is provided to the four species of *Polystichum* occurring in south-eastern Australia, since three of them have been recently published as new species.

In south-eastern Australia this genus is represented by four species, viz. *P. proliferum* (R. Br.) Pr., *P. australiense* Tindale, *P. formosum* Tindale and a new species which is described below. Two other species formerly placed in *Polystichum* in several Australian floras and check lists are now referred to *Rumohra*, viz. *R. aristata* (Forst. f.) Ching and *R. adiantiformis* (Forst. f.) Ching.

The commonest Australian species is *Polystichum proliferum* (R. Br.) Pr., which is found in rain forests and in open forests on hillsides and mountains from New South Wales to Victoria and Tasmania. In New South Wales this species is mainly found south of the Barrington Tops region. To my knowledge it is the only species of *Polystichum* occurring in Tasmania, where it is very plentiful in many parts of the island. Recently I described two new species of *Polystichum* from eastern Australia in the *South Australian Naturalist*, XX, 3 (1954), 31–35, viz. *P. australiense* from New South Wales and *P. formosum* from S.E. Queensland to Victoria. Another new Australian species is described below.

Polystichum fallax Tindale, sp. nov.

Rhizoma ascendens, 2–3 cm. crassum, paleis acuminatis, papyraceis, minute denticulatis, anguste lanceolatis vel lanceolatis, 10–15 mm. longis, 2–6 mm. latis, aut opacis et castaneis, aut bicoloribus (centro nigris, nitidis, rigidis et margine aliquando castaneis), dense vestitum; paleae basis rhizomatis filiformi-acuminatae, castaneae vel brunneae, lineares, fibrillosae, integrae, 12–30 mm. longae, 0·5–2 mm. latae. *Stipes* 10–22 cm. altus, erectus, ochroleucus vel stramineus, saepe squamellis fugacibus, dense fimbriatis ornatus, paleis etiam filiformi-acuminatis, papyraceis, 3–12 mm. longis, 2–4 mm. latis, lanceolatis vel anguste ovatis, basi fimbriatis aut opacis et castaneis vel brunneis aut interdum atrobrunneis et centro aliquantum nitidis vestitus, paleae basis stipitis lineares. *Lamina* 15–42 cm. longa, 7·5–22 cm. lata, subcoriacea vel coriacea, subtripinnata vel tripinnnata, anguste elliptica, late elliptica vel anguste ovata; apice acuta vel acuminata, sine gemmis proliferis. *Rhachis* fusca vel straminea, squamellis fugacibus, dense fimbriatis ornata, paleis castaneis, membranaceis, filiformi-acuminatis, linearibus vel lanceolatis, 1·5–5·5 cm. longis, 0·2–1·5 cm. latis, versus bases fimbriatis vestita. *Pinnae infimae* 4–14 cm. longae, 1–4 cm. latae, lanceolatae vel anguste ovatae, aliquando deflexae, apice acutae vel acuminatae. *Pinnulae* oblique rhomboideae, aristatae, ca. 10–20-jugae, 7·5–20 mm. longae, 4–10 mm. latae, apice mucronatae, basi obliquae, infimis acroscopis maximis. *Sori* mediales, rotundati. *Indusium* peltatum, fugax, brunneum vel castaneum, medio saepe fuscum. *Sporae* bilaterales, globoso-ellipsoidales, perisporiis ochroleucis, cristis convolutis brunneis vestitae, 41μ–54μ × 30μ–41μ,* ala angusta, saepe dissecta, 2μ–7·5μ lata addita.

The *rhizome* erect, 2 to 3 cm. broad, densely clothed with scales which are acuminate, papery, minutely denticulate, narrow lanceolate or lanceolate, 10 to 15 mm. long, 2 to

* The spores were boiled in a 10% solution of KOH for two minutes and mounted in glycerin before measurements were taken.

6 mm. broad, either dull and chestnut, or bicolorous and then black, glossy, rigid towards the centre and sometimes chestnut at the margin; the scales of the base of the rhizome filiform-acuminate, chestnut or brown, linear, fibrillose, entire, 12 to 30 mm. long, 0·5 to 2 mm. broad. *Stipe* 10 to 22 cm. high, erect, fawn or stramineous, often bearing fugacious, densely fimbriate squamules, clothed with scales which are hair-pointed, papery, 3 to 12 mm. long, 2 to 4 mm. broad, lanceolate or narrowly ovate, fimbriate at the base, either dull and chestnut or brown, or sometimes dark brown and somewhat glossy at the centre, the scales of the base of the stipe linear. *Lamina* 15 to 42 cm. long, 7·5 to 22 cm. broad, subcoriaceous or coriaceous, subtripinnate or tripinnate, narrow elliptical, broadly elliptical or narrow ovate; the apex acute or acuminate, without proliferous buds. *Rhachis* fawn or stramineous, bearing fugacious, densely fimbriate squamules, clothed with scales which are chestnut, membranous, hair-pointed, linear or lanceolate, 1·5 to 5·5 cm. long, 0·2 to 1·5 cm. broad, densely fimbriate towards the base. *Lowest pinnae* 4 to 14 cm. long, 1 to 4 cm. broad, lanceolate or narrow ovate, sometimes deflexed, the apex acute or acuminate. *Pinnules* obliquely rhomboidal, aristate, about 10 to 20 pairs, 7·5 to 20 mm. long, 4 to 10 mm. broad, the apex mucronate, the base oblique, the lowest acroscopic pinnules the largest. *Veins* anadromous, free. *Sori* medial, orbicular. *Indusium* peltate, fugacious, brown or chestnut, often with a dark centre. *Sporangia* with long, glandless pedicels. *Spores* bilateral, globose-ellipsoidal, with fawn perispores which have brown, convoluted crests, 41μ–$54\mu \times 30\mu$–41μ, including a narrow, often broken wing 2μ–$7{\cdot}5\mu$ wide.

Distribution: South-eastern Queensland and north-eastern New South Wales.

Holotype: Moreton district, Mt. Mistake, Queensland, on slopes in open eucalypt forest with *Themeda australis*, in crevices of rocks, C. E. Hubbard No. 5196, 24.11.1930 (NSW. P6744; K.).

Queensland: Toowoomba, Hartmann, 1882 (MEL.); Mistake Range, C. T. White, 11.1920 (BRI.); head of Dalrymple Creek, Hartmann, 1875 (MEL.); Wallangarra, J. L. Boorman, 4.1914 (NSW. P1937).

New South Wales: Slopes of Mt. Kaputar, Narrabri side, 4400 ft. alt., in rock crevice, basalt, in *Eucalyptus pauciflora* open forest, P. R. Messmer, 11.9.1953 (NSW. P6741); Coryah Gap, Nandewar Range, 3900 ft. alt., frequent along running creek, on basalt mountainside in forest, L. A. S. Johnson and E. F. Constable, 6.11.1954 (NSW. P6980); Coryah Gap to Mt. Kaputar, 4500 ft. alt., Johnson and Constable, 6.11.1954 (NSW. P6981); Mt. Exmouth, Warrumbungle Mts., 2750 ft. alt., basalt, rocky gully, E. F. Constable, 26.5.1948 (NSW. P5093); near the top of the Divide between Nundle and Barry, about 4100 ft. alt., R. H. Goode No. 180, 21.11.1954 (NSW. P7022; BM.); Murrurundi, R. H. Cambage No. 1780, 10.1907 (NSW. P1934).

P. fallax has a somewhat limited range, being restricted to the northern ranges of New South Wales and the mountains of south-eastern Queensland. On the whole it occupies drier, more inland situations than either *P. australiense* or *P. formosum*.

Key to the species of Polystichum *occurring in south-eastern Australia.*

1. Proliferous buds near the apex of the lamina. Squamules absent on the stipes and rhachises.
   2. Scales at the bases of the stipes burnished and mostly with a pale border. Distal lobes of the pinnules obtuse. Pedicels of the sporangia often with 1 or 2 stalked glands. Spores with rounded protuberances ..... *P. proliferum* 1.
   2*. Scales at the bases of the stipes dull and borderless. Distal lobes of the pinnules aristate. Pedicels of the sporangia glandless. Spores with brown, broadly alate perispores ..... *P. australiense* 2.

1*. Proliferous buds absent on the lamina. Fluffy, fawn, fugacious squamules on the stipes and rhachises.
   3. Scales of the rhizome and the base of the stipes dull or glossy, markedly dimorphic, the upper scales narrow lanceolate to lanceolate, the lower numerous, linear and 1·2 to 3·0 cm. long. Spores fawn with brown convolutions and a narrow, often dissected wing ..... *P. fallax* 3.
   3*. Scales of the rhizome and the base of the stipes dull, narrow lanceolate to ovate except for a few inconspicuous, cultrate scales 4 to 8 mm. long. Spores black or dark brown, tuberculate ..... *P. formosum* 4.

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I wish to thank the directors of the National Herbarium, Melbourne, and the Botanic Museum and Herbarium, Brisbane, as well as the Rev. R. H. Goode and Mr. N. A. Wakefield for their collections of *Polystichum fallax*. My thanks are also due to Professor R. E. Holttum for looking over the Latin description of my new species, and to the staff of the National Herbarium, Sydney, for their assistance in various ways.

EXPLANATION OF PLATE II.

A specimen of *Polystichum fallax*, n. sp. Photograph by the Government Printer of New South Wales.

N.B.—In the habitat notes on the photograph, *Eucalyptus parviflora* should read *Eucalyptus pauciflora*.

THE NYMPH OF *EUSCHÖNGASTIA PERAMELES* (WOMERSLEY, 1939): ACARINA, TROMBICULIDAE.

By Robert Domrow, Queensland Institute of Medical Research, Brisbane.

(Nine Text-figures.)

[Read 30th March, 1955.]

Synopsis.

The nymph of *Euschöngastia perameles* (Wom.) is described, being the first of this genus to be correlated with its larva in Australia. The nymphs emerged 18 to 31 days after detachment, including an active period up to seven days before quiescence.

Of more than sixty known Australian species of Trombiculidae *sens. strict.*, only eleven are known as nymphs or adults. These include four nymphs or adults of which the larvae are unknown, six of which larvae and either nymph or adult are known, and one in which correlation is circumstantial. Correlation between larva, nymph, and adult is complete in only four species, but not with Australian material.

Larvae of more than 25 species of *Euschöngastia* Ewing are recorded from Australia, but very little is known of their nymphs or adults. Womersley and Heaslip (1943) recorded larvae of *E. indica* (Hirst) from Queensland, but, though its nymph and adult are well known from S.E. Asia and New Guinea, no Australian material has been bred. It is not known whether *Schöngastia westraliensis* (Wom., 1934), described from a single adult, is a true *Schöngastia* or a *Euschöngastia*.

The nymph of *Euschöngastia perameles* (Wom., 1939) is described in the present paper. The larvae are common on the bandicoot, *Isoodon obesulus*, in S.E. Queensland, their favourite site of attachment being the soft perineal skin, where they cluster in small groups, producing swollen areas about 3 mm. wide with ulcerated centres. These form thick serous scabs, in which the larvae are embedded "rosette-fashion", though not covered externally. The larvae form typical sucking tubes, which penetrate the scab and are visible in sections of ulcerated skin. The yellow, engorged larvae are easily picked out with a needle, or disengage themselves if the isolated scab is left standing overnight. Three series of larvae were set up to obtain nymphs.

Method.

All three series were placed in excavated blocks with moist soil or filter paper, and condensed droplets of water were always present on the lid. The blocks were then placed in a sealed chamber over a saturated solution of ammonium chloride, giving a relative humidity of 80%. The temperature ranges of the three series were 61 to 81°F., 64 to 82° (except for three days when the temperature dropped as low as 54°), and 61 to 88° respectively.

Four larvae (Annerley, Brisbane, 25.v.54), were set up in the first series. Next day three were quiescent, with their legs stretched upwards and forwards, while the fourth was still active. This one was transferred to a separate block with sterile soil, because fungus appeared in the original block; it became quiescent that afternoon. The other three were lost to fungus. On the eleventh day, a yellowish mass retracted from the anterior part of the nymphochrysalis, giving the legs, podosoma, and scutal region a pale, empty appearance. On the twelfth day this effect had increased, the yellow mass was smaller and more concentrated, and the body had become relatively elongate, with a faint medial constriction. On the eighteenth day a velvety, straw-coloured nymph, which darkened to yellow after four hours, was found. The larval pelt was not recovered. The nymph was quite active, and had no difficulty in walking over, or insinuating itself